Appendix E
Best Management Practices

Best Management Practices (BMPs) and Applicable BLM Standards and Guidelines*

Environmental Best Management Practices

1. Begin interim reclamation of the well and access road as soon as practicable after the well is placed in production. Group facilities in order to allow for maximum interim reclamation. Interim reclamation would include road cuts and fills, and would extend to within a close proximity of the wellhead and production facilities.
2. Paint all aboveground facilities, including power boxes, building doors, roofs, and/or any visible equipment a color that best allows the facility to blend into the background (color(s) would be selected from the latest national color chart).
3. Design and construct all new roads to a safe and appropriate standard that is "no higher than necessary" in order to accommodate intended vehicular use. Roads would follow the contour of the land, where practical.
4. Recontour all disturbed areas, including access roads, to the original contour or to a contour that blends with the surrounding topography and revegetate all disturbed areas as part of final reclamation.
5. Install raptor perch avoidance devices on all new powerlines and on all existing powerlines that present a potential hazard to raptors.
6. Bury all powerlines and flow lines in, or immediately adjacent to, the access roads.
7. Centralize production facilities in order to avoid placing tanks and associated facilities on each well pad.
8. Evaluate the use of submersible pumps, especially in VRM Class I, II or III areas, as well as in any area visible to the visiting public.
9. Evaluate placing wellheads below ground in high visibility areas.
10. Drill multiple wells from a single well pad.
11. Utilize noise reduction techniques and designs in order to reduce noise.

General Construction Activities

1. Limit construction in riparian areas and in wetlands. Avoid locating new concentrated-use sites in these areas.
2. Avoid crossing streams, wetlands, and/or riparian areas during the construction of infrastructure (including pipelines, roads, power lines, etc.) to the extent practicable. In the event that a wetland or a riparian area must be crossed or disturbed, additional (site-specific) mitigation would be required. The mitigation measures would be identified by a hydrologist, riparian ecologist, road engineer, and/or other specialist, as appropriate, and would address long-term wetland function.
3. When construction is necessary, roads and infrastructure within riparian areas should not directly parallel the stream channel.
4. Maintain or restore at least 80 percent of potential groundcover within 100 feet from the edges of all perennial streams, lakes, and/or other bodies of water. Maintain or restore at

least 80 percent of potential groundcover to the outer margin of the riparian ecosystem, where it is wider than 100 feet.

5. Locate drilling mud pits outside active floodplains, unless alternate locations are more environmentally damaging. If location is unavoidable, seal and dike all pits in order to prevent leakage.
6. All crossings of wetlands and/or of other waters of the U.S. should comply with the appropriate United States Army Corps of Engineers (USACE) regulations (for example, Nationwide Permits 12 and 14). If potential effects exceed the limits of the nationwide permits (NWPs), then individual permits (IPs) must be obtained.
7. Develop site-specific mitigation plans during the application for permit to drill (APD) plan of development or Sundry Notice approval process for all proposed disturbance to wetlands and/or to riparian areas.
8. Avoid, when possible, using heavy equipment in areas that are easily compacted and/or susceptible to soil rutting and/or surface water accumulations.
9. Keep heavy equipment out of streams, swales, and lakes, except when crossing at designated points, building crossings, or when completing restoration work; or when such bodies of water are protected by at least 1 foot of packed snow or 2 inches of frozen soil. Keep heavy equipment out of streams during fish spawning, incubation, and/or emergence periods. Do not disrupt water supply or drainage patterns flowing into wetlands.
10. Do not excavate material from, or store excavated material in, any stream, swale, lake, or wetland.
11. Implement construction practices that do not encroach on fills and limit sedimentation into streams, swales, lakes, and/or wetlands.
12. Prohibit the depositing of soil material from drilling, processing, and/or site preparation into natural drainages.
13. Locate the lower edge of disturbed and/or deposited soil banks outside of active floodplains.
14. Locate mineral removal activities away from the waters edge or to outside of the riparian area.
15. Begin reclamation of disturbed wetlands and/or riparian areas (or replacement, if necessary) immediately after project activities are complete.
16. Limit construction of well pads, roads, and/or pipelines on slopes greater than 30 percent.
17. Retain stabilizing vegetation on unstable soils. Avoid new road construction and/or heavy equipment use on unstable or highly erodible soils.
18. Avoid disturbance of unstable stream banks and/or of headwall areas.
19. Minimize erosion at sites located in steep terrain during the construction phase by measures such as contouring, water bars, temporary ditches, and or/ detention basins, and minimize the period of disturbance.
20. Key sediment traps into the ground and maintain them regularly in order to ensure proper function. Deposit removed sediment in an appropriate location, such as a stable, gentle, upland site, and revegetate, if applicable.

21. Implement BMPs in order to slow or reduce the flow of surface-water runoff across disturbed areas, including the diversion of surface runoff around facilities and/or the installation of erosion-control devices in order to prevent sedimentation of nearby water bodies.
22. Maintain roads, as needed, in order to keep the road surface drained during thaws and/or breakups during winter operations. Perform snow removal in a manner that protects the road and other adjacent resources. Do not use riparian areas, wetlands, or streams for snow storage or disposal. Remove snow berms where they would result in accumulation or concentration of snowmelt runoff on the road or erodible fill slopes. Install snow berms where such placement would preclude concentration of snowmelt runoff and would serve to rapidly dissipate melt water.
23. Close roads, pads, and/or drill sites that are found to no longer be meeting BLM management objectives, and decommission them, as appropriate. Decommissioning may include: blocking the road's entrance, recontouring the disturbed surface and side slopes, revegetating disturbed surfaces, removing culverts and/or other material drainage structures and crossings, and restoring stream channels and natural flow paths. Disturbed and/or exposed surfaces should be revegetated to a minimum of 80 percent of potential groundcover following the first year of closure.
24. Prepare a Stormwater Management Plan for all construction sites, as required by law, statute, regulation, permit, and/or policy.
25. Route surface runoff from well pads into reserve pits, where appropriate.

Roads and Crossings

(NOTE: For the purpose of this DRMP/DEIS, a "road" is defined as a route for designated travel, regardless of the type of travel; and "off-road" is defined as cross-country travel between designated roads. All off-road travel by motorized and/or mechanized vehicles is prohibited on the Monument.)

1. Roads should be constructed to the minimum dimensions needed in order to function properly, and should roll with the terrain, when possible, in order to minimize excavation and reduce surface runoff.
2. Renovate existing roads, as a preferred BMP, rather than construct new roads, where such renovations would sufficiently reduce environmental impacts as compared with new construction.
3. Renovate/reconstruct roads in order to reduce erosion and improve drainage. Such practices may include resurfacing; crowning or outsloping of the road prism; revegetating cut and fill slopes and ditchlines; and/or replacing undersized, deteriorating, and/or damaged crossings.
4. Establish vegetation groundcover on disturbed areas (excluding running surface) to at least 60 percent of potential within two years. On low productivity sites, establish to at least 4 percent of potential groundcover.
5. Grade roads at 2 to 10 percent, with a maximum grade of 15 percent, when possible. Steeper grades may be considered where they would result in lesser environmental impact. Avoid road grades of less than 2 percent.
6. Conduct road construction activities during dry or frozen soil conditions, as practicable.

7. Consider using drain dips and/or water bars on roads that have gradients of less than 10 percent, and avoid dips on road gradients of over 10 percent.
8. Revegetate all disturbed surfaces using certified local native plants, where practicable.
9. Use dust control measures, as needed, in order to minimize the production of fugitive dust during the construction phase. Dust control measures used during the production phase would be assessed on a site-specific basis, and implemented as needed.
10. Design road ditches and crossdrains in order to limit flow to ditch capacity and to prevent ditch erosion and failure.
11. Design placement of all crossdrains in a manner that avoids discharge onto erodible and/or unprotected slopes, including slumps, side-cast fills, and headwalls, and that avoids discharge directly into stream channels. Provide a buffer or sediment basin between the crossdrain outlet and stream channels, where needed. Stabilize the road surface between crossdrains in order to limit erosion and sediment entering surface runoff.
12. Provide energy dissipaters (i.e., rock weirs) at culvert outlets and/or drain dips where water is discharged onto loose and/or erodible material.
13. Install road-grade culverts in areas of excessive runoff and follow construction BMPs in order to minimize runoff and erosion.
14. Space crossdrains according to road grade and soil type, as indicated below. Do not divert water from one stream to another.

Maximum Cross-Drain Spacing in Feet, Based on Soil Types				
Road Grade (%)	**ML, SM Extra Erodible Silts-Sands with Little or No Binder**	**MH, SC, CL Highly Erodible Silts-Sands with Moderate Binder**	**SW, SP, GM, GC Moderately Erodible Gravels, Plus Fines and Sands with Little or No Fines**	**GW, GP Low Erodible Gravels with Little or No Fines**
1 - 3	600	1000	1000	1000
4 - 6	300	540	680	1000
7 - 9	200	360	450	670
10 - 12	150	270	340	510
13 - 15	120	220	270	410

Note: These are maximum spacing. They should be reduced, if warranted, by onsite factors such as expected road use, downslope stability, erosion hazards, and/or filter strip capability in order to trap runoff and sediment and to conserve ground cover integrity given the extra water. Combine these spacing with additional measures in order to minimize damage to ditches, slopes, and/or streams. For example, shorten or extend the spacing, where needed, in order to move a crossdrain outlet from a stream headwall to a convex slope.

15. Consider the natural width-to-depth ratio of the stream when constructing, renovating, and/or replacing channel crossings.
16. Design culverts and/or bridges in a manner designed to not inhibit the natural passage of debris and/or materials downstream, under typical conditions.

17. Install, where practicable, stream crossings on straight and resilient stream reaches, as perpendicular to flow as practicable, and provide for the passage of fish and other aquatic life, where present.

Livestock Management

1. Design grazing management systems that require a minimum investment in range improvements, but that will meet grazing and management objectives.
2. Provide rest from grazing in order to allow for the establishment of vegetation in rehabilitated areas. Install cattle guards and fences, as needed, in order to control livestock movement into these areas.
3. Manage livestock use through control of timing, intensity, and duration/frequency of use in riparian areas and wetlands in order to maintain or improve long-term stream health. Exclude livestock from riparian areas and wetlands that are not meeting, or moving towards meeting, desired condition objectives or where monitoring information shows continued livestock grazing would prevent attainment of those objectives.
4. Monitor livestock use and resulting levels of utilization in order to determine the proper carrying capacity of allotments.
5. Locate and store stock tanks, salt supplements, and similar features out of riparian areas and/or wetlands. Keep stock driveways out of riparian areas, except to cross at designated points. Armor water gaps and designated stock crossings, where needed and as feasible.
6. Do not allow livestock to graze an entire growing season in pastures that contain riparian areas and/or wetlands. Apply short-duration grazing, as practicable (generally less than 20 days). During warm weather, manage livestock herds in a manner that avoids their concentration in riparian areas and/or wetlands.
7. Design grazing systems to limit utilization of woody species, especially in riparian areas. Where woody species have been historically suppressed, or where the plant community is below its desired condition and livestock are a key contributing factor, manage livestock through control of time/timing, intensity, and duration/frequency of use, to allow for riparian hardwood growth extension and reproduction.
8. Consider, when timing livestock moves between units, the degree of livestock trampling and riparian vegetation utilization on or immediately adjacent to stream banks. Strive to maintain the extent of stable banks in stream reaches at 74 percent or more of reference conditions.
9. Manage pastures in order to minimize soil compaction and restore soil structure, especially in riparian areas and wetlands. Increase productivity of these sites through mechanical treatment and/or through seeding with native species or well-adapted and desirable introduced species.
10. Emphasize natural stabilization processes consistent with the stream type and capability (Rosgen and Proper Functioning Condition processes) when restoring damaged streambanks. Use native vegetation for streambank stabilization, where practicable.
11. Minimize grazing conflicts with recreation activities by limiting use levels and season of use, providing fences designed to exclude livestock from high-use areas, and siting water sources and/or other facilities away from recreation-use areas.

12. Fence specific archaeological sites, as necessary. Continue to perform site-specific clearance on range improvements projects.

Fire Management

1. Maintain organic groundcover, where possible, in order to minimize the formation of pedestals, rills, and/or surface runoff.
2. Do not build firelines in or around wetlands, unless they are needed to protect life, property, and/or wetland resources. Use natural features as preferred firebreaks over constructed firelines. When possible, use hand crews to construct firelines within, or adjacent to, wetlands and/or riparian areas.
3. Retain organic groundcover in filter strips during prescribed fires. As a firebreak, build firelines outside filter strips, unless tied into a stream, lake, and/or wetlands.
4. Build firelines with rolling grades and minimum downhill convergence, where practicable. Outslope or backblade, permanently drain, and revegetate firelines shortly after the burn. Use certified local native plants, where practicable, to revegetate burned areas.
5. Conduct prescribed fires in a manner that minimizes the residence time on the soil while, at the same time, conducting them in a manner that meets the burn objectives (such as when soils are moist).
6. Locate temporary labor, spike, logging, and/or fire camps in a manner that protects surface and subsurface water resources. Consideration should be given to the disposal of human waste, wastewater, garbage, and/or other solid wastes.

Noxious Weed Management

1. Inspect and clean off-road motorized equipment of all soil, plant, and/or other organic materials before entering into relatively weed-free areas. In areas of heavy noxious weed infestations, equipment must be cleaned prior to leaving the area.
2. Include monitoring provisions for reclamation, revegetation, and post-reclamation in all soil-disturbing project proposals.
3. Seed all disturbed soil (except traveled roadways) upon work completion at each site, unless ongoing disturbance at the site would prevent seed establishment, for all construction, reconstruction, and/or maintenance activities. In the case of continued disturbance, seed upon completion of final disturbance. Seed mixes must be approved by the Authorized Officer. Seed must be certified weed-free and/or analyzed (as deemed appropriate by the Authorized Officer) before purchase in order to ensure minimum weed content.
4. Use weed-free sources for gravel and fill to be placed in relatively weed-free areas, as approved by the Authorized Officer.
5. All pack and/or saddle stock feed and straw brought into the Monument must be certified weed-free.
6. Time pasture rotations in order to prevent livestock movement from infested to non-infested pastures.
7. Use broadcast burning, where appropriate, rather than dozer piles, during prescribed fire operations in order to prevent excessive heat transfer to the soil.

8. Resource Coordinators on Incident Overhead Teams and Fire Rehabilitation Teams will consider weed-risk factors and weed-prevention measures in developing resource protection recommendations.
9. Do not allow bare-ground treatments around oil and gas and/or pipeline production facilities during the 12-month period prior to abandonment.

Mineral Operations

1. Require pre-permitting meetings with the BLM, proper construction techniques, the maintenance of production facilities, and full-site reclamation at the final abandonment stage for all mining and energy operations.
2. Promptly plug and retire non-productive wells, and associated flowlines and equipment, in order to avoid leaks, breaks, and/or subsequent spills.
3. Require operations to develop and implement Spill Prevention Control and Countermeasure (SPCC) and emergency response plans in order to prevent, contain, and/or remediate spills. Workers should also be well trained in the implementation of these plans.
4. Conduct routine inspections of facilities, pipelines, and/or well sites in order to evaluate whether or not there are spills and/or leaks; take corrective actions, as appropriate.
5. Use non-toxic, non-hazardous drilling fluids, when practicable.
6. Report spills and appropriate clean-up actions taken, in accordance with applicable State and Federal laws, rules, and regulations. Remove contaminated soil and/or other material from the Monument and dispose of it, in accordance with applicable State and Federal laws, rules, and regulations.
7. Minimize wildlife habitat fragmentation by mining operations by: minimizing the number and extent of roads, utilities and well pads; drilling multiple wells from a single pad; mitigating hazards to wildlife; reducing noise in sensitive areas; monitoring production facilities remotely; and conducting intermediate and full reclamations.
8. Reduce Impacts on visual resources from activities by: repeating elements of form, line, color, and texture found in the landscape; considering visual elements in the location of roads and well pads, and the selection of structures; reducing unnecessary disturbances; and by reclaiming and restoring abandoned sites.
9. Conduct archaeological surveys, in compliance with Section 106 of the National Historic Preservation Act, prior to resource development; minimize road and surface disturbance; appropriately locate roads and well pads; and install temporary fencing designed to protect site boundaries, in order to minimize impacts to cultural resources.

* Allowances and consideration for human health and property safety must be included in every instance of application of BMPs.